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February 24, 1997

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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF SECRETARY

By Hand

William F. Caton, Acting Secretary
Federal Communications Commission
1919 M Street, N.W., Room 222
Washington, D.C. 20554

Re: Notice of Oral and Written Ex Parte Presentation: [REDACTED], Gen.
Docket No. 96-285

Dear Mr. Caton:

On February 21, 1997, representatives of the Boeing Company met with Dan Phythyon, Gerald Vaughan, Karen Brinkmann, and David Horowitz of the Wireless Telecommunications Bureau to discuss spectrum use fees for private radio licensees. The points raised by Boeing's representatives during the meeting are contained in the attached hand-out. Representing Boeing were Sheldon R. Bentley and the undersigned. I have enclosed the original and five copies of this letter and its attachment. In accordance with the Commission's rules, please place a copy of this letter and the attachment in the public record of each of the above-referenced dockets.

Sincerely,



David Alan Nall

Enclosure

cc: Dan Phythyon, Gerald Vaughan, Karen Brinkmann, David Horowitz

Frequency Spectrum Issues

Ex Parte Presentation

PR Docket No. 92-235

The Boeing Company

February 21, 1997

The Boeing Company

(FY 1994)

Annual Revenues **\$21,924.M**

Foreign Sales **\$11,844.M**

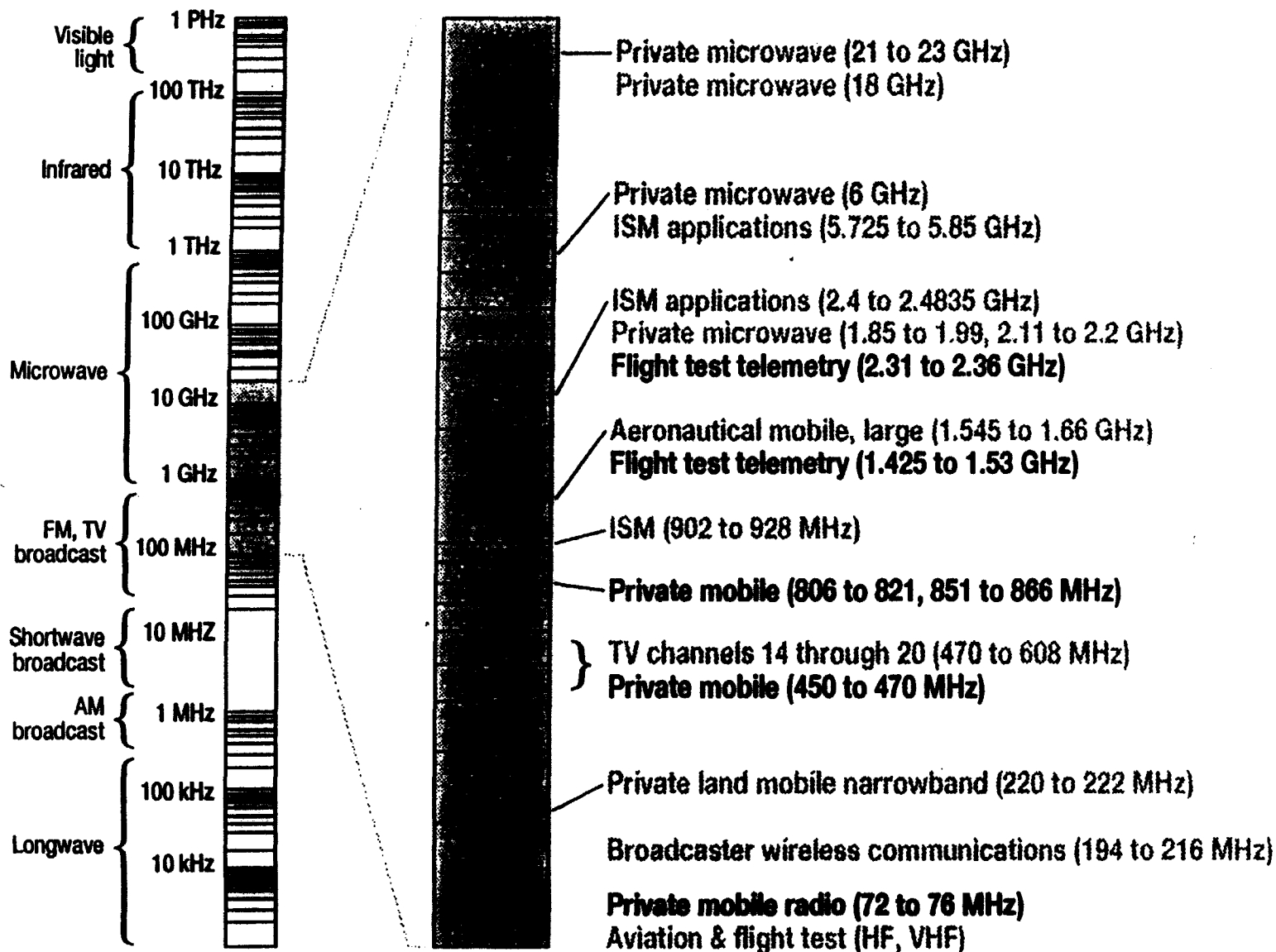
Employment

- ◆ **Employees (average)** **119,400** **individuals**
- ◆ **Subcontractors** **10,666** **companies**

Facilities

- ◆ **Washington (Operations cover 1,300 Square Miles)**
- ◆ **Alabama**
- ◆ **California**
- ◆ **Kansas**
- ◆ **Montana**
- ◆ **Pennsylvania**
- ◆ **Texas**
- ◆ **Subcontractors - all 50 states**

Major Boeing Spectrum Uses



Boeing Spectrum Uses

Boeing Does Not Use Spectrum to Provide Services to Third Parties

Boeing Uses Spectrum for Safety and Health Reasons:

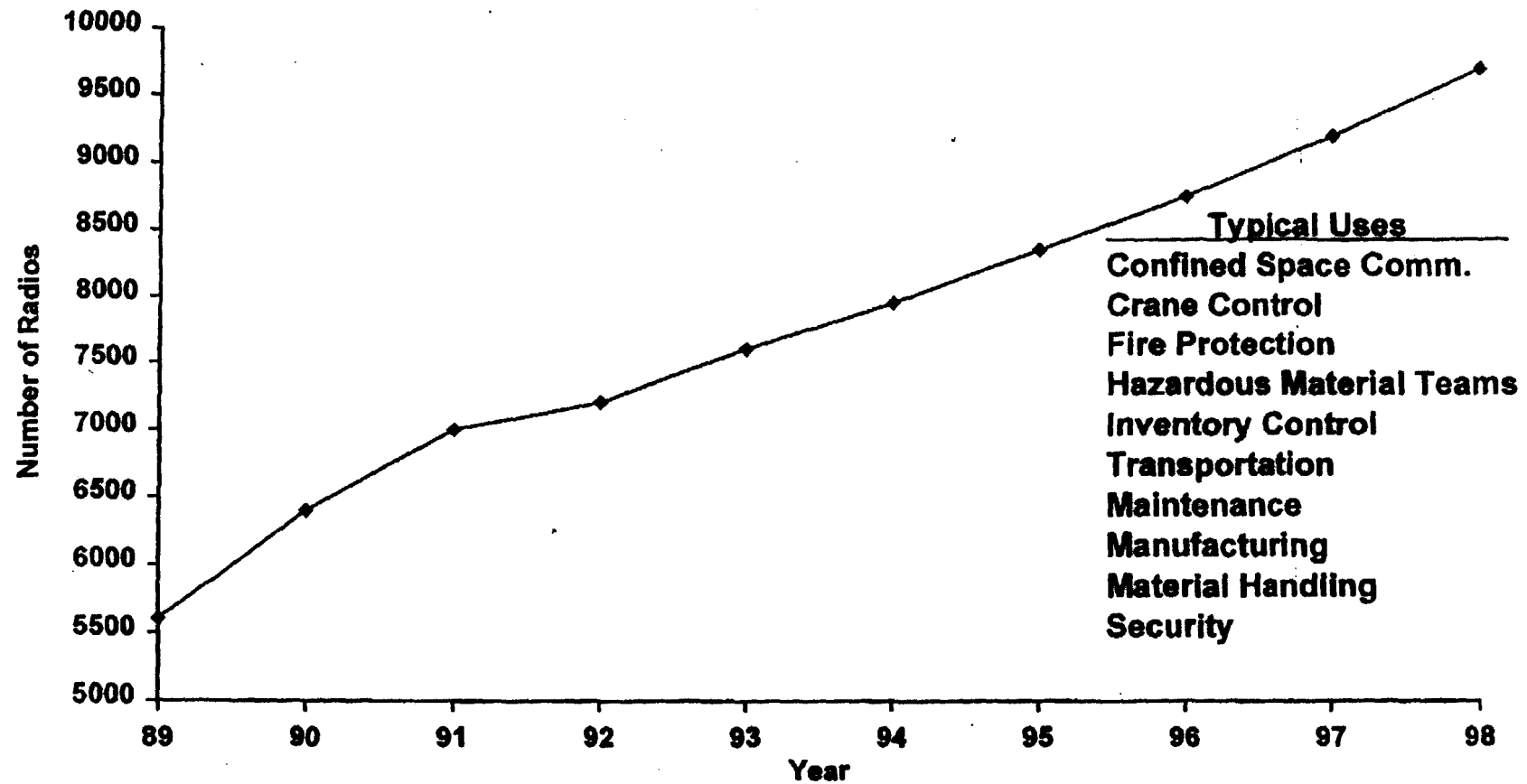
- ◆ Flight test telemetry
- ◆ Regulatory compliance -- Communication System for Confined Hazardous Areas (CSCHA), Hazardous Material (HazMat) response, "man-down" alarms
- ◆ Fire, security, alarms, emergency response, ties to municipalities for mutual aid

Boeing Uses Spectrum for Productivity Improvement:

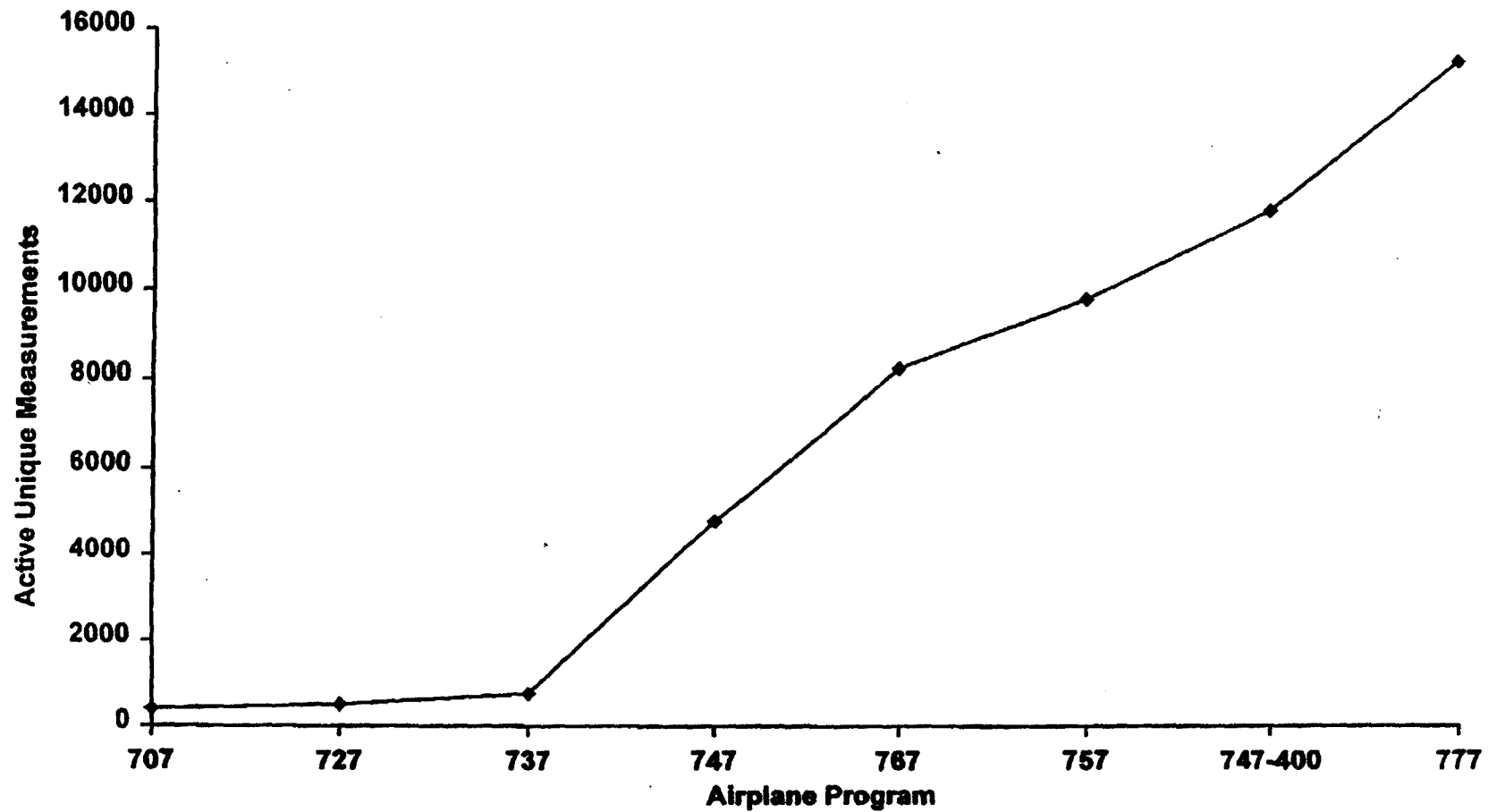
- ◆ Fabrication, machine programming, control and monitoring, cranes, material handling
- ◆ Data links, robotics, wireless local area networks (LANS), telecommunications backup, R & D
- ◆ Transportation

Boeing Foresees a Growing Demand for Spectrum Uses

Puget Sound Area Radio Growth



Flight Test Measurement Growth 1954 - 1995



Future Telemetry Projections

Bandwidth and Capacity Requirements Are Being Driven by New Technologies:

- ◆ Faster data buses and flight safety validation requirements
- ◆ Airframe and digital flight controls designed as integrated systems
- ◆ Real-time video needs to evaluate new structural materials
- ◆ Correlation of visual data and test sensors

Bandwidth Need Is Greater Than Linear With Time

<u>Year</u>	<u>Airframe</u>	<u>Data Points</u>	<u>Bandwidth</u>
1954	707	300 (approx.)	200 kHz
1995	777	40,000	20+ MHz

Spectrum Use By Boeing Customers

Commercial Airplane Customers

- ◆ **Communications**

Private Land Mobile, HF & VHF Air-Ground-Air and Air-Air Comm., ACARS, SATCOM

- ◆ **Navigation**

GPS, Differential GPS, Radar, T/CAS, DME, Altimeters, Rescue Beacons, Transponders, Weather Radar, FANS

- ◆ **Performance reporting**

HF/VHF Datalink

- ◆ **Passenger services**

Cabin Service, In-Flight Telephones, Faxes, E-mail, Sky Radio, DBS-TV

Defense Customers

- ◆ **Military**

VLF, HF, VHF, & UHF Comm. Links, DGPS, DME, Telemetry, ILS, C-Band Remote Navigation System, Synthetic Aperture Radar, Microwave, Cross Band EMI testing

- ◆ **NASA**

GLS, TT&C (TLM) Uplink, TDRS Downlink,

Satellite Customers

- ◆ **Direct Broadcast Satellite**

A/C Cabin Entertainment System

- ◆ **Communications**

A/C Test Data, Sea Launch, Iridium

- ◆ **Earth resource mapping**

- ◆ **Weather**

Spectrum Costs

Radio Spectrum Is Not "FREE"

Boeing's Costs Include:

- ◆ Equipment investment (book value) \$108.M (1994 Dollars)
- ◆ Maintenance \$2.M per year (approx.)
- ◆ FCC license application fees, FCC regulatory fees, spectrum coordination fees, staff, coordinators and association/coalition memberships \$1M per year (approx.)

These Costs Are Not Unique to Boeing

Boeing and Its Customers Therefore Have Very Real Economic Incentives to Use Spectrum Efficiently:

- ◆ To reduce costs and remain competitive
- ◆ To use existing spectrum allocations for new applications

Spectrum Allocation and Licensing

Congress Has Directed the FCC in Allocating and Licensing Radio Spectrum to:

- ◆ Promote the public convenience, interest, and necessity
- ◆ Promote the development and timely deployment of new and innovative radio services and technologies
- ◆ Promote the efficient and intensive use of radio spectrum
- ◆ Recover, where appropriate, "a portion of the value of the public spectrum resource made available for commercial use"

Spectrum Realities

Industry Needs BOTH Private Radio and Commercial Radio Spectrum and Services to Satisfy Its Communications Needs

Commercial Mobile Radio Services Provide Effective and Efficient Solutions to Many of the Communications Needs of Industry

- ◆ Cellular -- sales, some transportation
- ◆ Direct Broadcast Satellite (DBS) -- distribution of information
- ◆ In-flight phone -- business travelers

Private Radio Often Provides the ONLY Solution to Many Communication Needs

- ◆ Emergency services -- natural disasters, accidents, emergency response, fires
- ◆ Safety services -- "man down" alarms
- ◆ Factory floor operations -- cranes, other machinery

Flight Test Telemetry -- Unique to Aerospace

Spectrum Realities

(continued)

Some Needs Can Be Satisfied by Both Commercial Mobile and Private Radio Services, But With Varying Degrees of Cost and Efficiency

- ◆ Cellular provides mobile communication, but is inflexible and suffers from inadequate coverage, security, and priority of services
- ◆ Commercial mobile services can be up to 40 times more expensive than private radio
- ◆ Commercial mobile radio service providers have not responded to the needs of industry for tailored wireless services in "thin" markets

Boeing Does NOT Treat All Radio Services as "Add-On" Capabilities

- ◆ Boeing integrates radio services into its manufacturing processes and optimizes for efficiency and flow time.

Spectrum Economics

Auctions Should Only Be Utilized Where the Principal Use of the Spectrum Will Be to Provide Communications Services to Third Parties for Profit.

Auctions Are Appropriate for Such Services Because They Produce Revenues That Reflect the Value of the Business Being Entered, Rather Than the Value of the Spectrum Itself.

Private Users Will Almost Always Bid Less Than Entrepreneurs Planning to Use Spectrum to Provide Service to Third Parties for Profit

If Private Radio Spectrum Is Auctioned, Users Will Be Compelled to:

- ◆ pay economically unrealistic prices for spectrum, thereby damaging their competitiveness
- ◆ significantly change their operations, e.g., off-shore production
- ◆ attempt to recoup their "investment" by diverting resources and service to third parties

Spectrum Economics

(continued)

Competitive Bidding Would Preclude the Use of Private Radio Spectrum by Boeing because:

**PCS Auctions Produced \$8.733B (ten year licenses)
(or \$6.50 per kHz per 1,000 sq. miles/year)¹**

Applying the Same Results to the License Period:

- ◆ **Boeing would increase costs by approximately \$40M**
- ◆ **The aerospace industry would increase costs by approximately \$250M²**
- ◆ **All U.S.-based manufacturers would increase costs by approximately \$6B³**

¹ Nathan Associates, Inc.

² Aerospace Industries Association of America, Inc.

³ Ibid.

Summary of Boeing Perspective

Spectrum Management Should Reflect the Differences in User Purposes

- ◆ Private use -- managed by coordination and cooperation
- or
- ◆ Commercial use -- managed by free market competition

Method of Value Recovery

Method	Private Use ("Private Radio")	Third Party Use (Resale)
◆ Competitive Bidding	Inappropriate	Appropriate
◆ License Fees	Appropriate	Inappropriate

Frequency Spectrum Issues

-- Inefficiency License Fees --

PR Docket No. 92-235

The Boeing Company

February 21, 1997

Summary of Boeing Perspective

All spectrum should be subject to some fiscal incentive for efficient use



One way to begin is to classify all spectrum as either:

Third Party use (CMRS / Resale) & subject to Competitive Bidding (Auction) Incentives

-- or --

Private use (Private Radio) & subject to Efficiency Based (License Fee) Incentives



Spectrum Class		Allocation Process	Fiscal Incentives
	CMRS/Resale	Auctions (No License Fee)	Free Market (Bid Opportunity Costs)
	Private Radio (All Others)	License Fee (Efficiency Based & NOT Auction)	Fee Amount (Influence Technology Investments)

Summary of Boeing Perspective

Spectrum Management should be based on :



EQUITY BETWEEN spectrum allocated to **DIFFERENT USERS**

EFFICIENCY WITHIN spectrum allocated to **EACH CLASS OF USER**



EQUITY BETWEEN each and every  and  is principally a **POLITICAL PROCESS (Legislative)**

EFFICIENCY WITHIN any  is principally an **ECONOMIC INCENTIVIZING PROCESS (Regulatory)**

<u>Spectrum Class</u>		<u>Allocation Process</u>	<u>Fiscal Incentives</u>
	CMRS/Resale	Auctions (No License Fee)	Free Market (Bid Opportunity Costs)
	Private Radio (All Others)	License Fee (Efficiency Based & NOT Auction)	Fee Amount (Influence Technology Investments)

Summary of Boeing Perspective

License Fees Should :

For Licensees :

- **Reward licensees who use spectrum efficiently**
- **Not be market based, i.e., at levels of Auctions, because**

**Licensees cannot realize spectrum opportunity costs, and, therefore,
should not be expected to pay "Auction" prices**

For Government :

- **Be pragmatically & equitably calculated, i.e., minimized regulation & complaints**
- **Be easily administered & enforceable – Requires enabling Legislation & subsequent Regulation**

For Both :

- **Have the support of licensees -- "self-implementing"**
- **Promote development & timely deployment of new and innovative radio services and technologies**
- **Promote the efficient and equitable use of the spectrum**

Summary of Boeing Perspective

Market parameters AND system use MAY or MAY NOT mean spectral efficiency

License Fees Should :

- NOT be based on Market Parameters : Because :
Systems in Rural or Urban Areas¹, or Manufacturers and Businesses locate in labor markets for "employment" reasons as opposed to telecommunication "market" reasons
- NOT be based on Population² :
Coverage The "coverage" for Private Radio is targeted to facilities, business routes, etc., and NOT the population "coverage" of a community
Density Private Radio applications are independent of the population "coverage" and the population "density" of a community
- NOT be based on System Use³ :
Hours per day Certain critical business and manufacturing systems require only limited on-demand air-time (e.g., RF crane control units, man-down systems to meet OSHA requirements, etc.). Private Radio applications do not share the same objective of "maximum" loading of a commercial system

¹ Using Market Based Spectrum Policy to Promote the Public Interest, Rosston & Steinberg, Jan 1997, p 19.; ITA memo, Jan 3, 1997, Mark E. Crosby to Gregory Simon, cc: Michelle Farquhar, p 4, footnote 4.; Draft Spectrum Efficiency Reform Act of 1997.

² PR Docket 92-235, p 62, Para 137

³ For "Private Goods", Private Benefits = f (use) – BUT – for "Public Goods", Public Benefits ≠ f (use) (i.e., no fire & no use is good public benefit)

Summary of Boeing Perspective

License Fees Should :

(In Principle)

- Be based on efficiency of allocated spectrum

Fee = f (Spectrum Allocated/User)

so Fee \uparrow if f (\uparrow)

-- or --

Fee = g (# of Users/Spectrum Allocated)

so Fee \uparrow if g (\downarrow)

- A graduated fee structure should be
 - 1) Based on recommendations from User communities
 - 2) Challenged and tested for equity among the various services by a central oversight body, and
 - 3) Adopted into regulation by the FCC
- Inefficiency spectrum allocations and technologies should result in higher fees than efficient allocations and state-of-the-art technologies (Label as Inefficiency Fees)

The most efficient allocations and technologies possible should have a "Base" License Fee

Fees should not be so high as to discourage use of efficiency-enhancing state-of-the-art radio technology

Fees should be relevant within (EFFICIENCY WITHIN) each "pool", because like users and industries face the same economics and opportunity cost externalities

Summary of Boeing Perspective

For Most "Pools", License Fees Should :

(In Specific)

- **Be based on⁴**

1) Amount of Assigned Bandwidth

e.g.

For per channel bandwidths of 25 kHz a licensee could pay up to four times that of one using a 6.25 kHz channel bandwidth

2) System Coverage Area

Fees proportional to square miles of coverage on a site-by-site basis (but NOT CMRS wide service license areas such as MTAs, BTAs, etc.)

3) Use of Spectrum Efficient Technology

Fees proportional to efficiencies provided by technologies employed (e.g.: ACSB, CDMA, FDMA, F-TDMA, TDMA, etc.)

a) No. of channels per unit of spectrum

b) Amount of throughput per channel

c) Number of mobile units per channel

4) Exclusivity That Leads to Efficiency

If employment of spectrally efficient technologies requires license exclusivity to serve more users or use less spectrum (e.g., Trunking, Digital, etc.) fees should be proportional

⁴ To achieve a given degree of reliability